Concepts of Artificial Intelligence (07-180)

Prof. Reid Simmons rsimmons@andrew.cmu.edu

Class meetings: Tuesdays & Thursdays 3:00-4:20 pm, 2315 Doherty Hall
Instructor office hours: Mondays 2-3pm, 3213 Newell-Simon Hall
Teaching assistants: Angela Yang (head), Jimin Byun, Sean Chang, Adejuwon Fasanya, Mikayla Gawarecki, Fern Limprayoon, Gabriel Rasskin, Amanda Steiner, Audrey Tzeng, Emily Zheng
TA office hours: Tues, 6:30-8:30 (GHC5, Carrel 2); Wed, 4:30-6:30 (GHC5 Table 3), Thurs 4:30-6:30 (GHC5 Table 3), 6:30-8:30 (GHC5, Carrel 2)
Communication: Preferred communication with the instructor and TAs will be through Piazza

Course materials: *Optional*: Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach (Third Edition)"

Course description

The course will introduce students to the main foundational concepts and techniques used in Artificial Intelligence (AI), including representation, heuristic search, automated problem solving and decision making, and machine learning. Students will be introduced to the history of AI, as well a range of real-world applications in which AI is currently used. Programming-based assignments will enable students to get a feel for AI techniques. This course is required for students who wish to apply for acceptance into the AI major.

Learning objectives

AI is a large and rapidly growing field that combines insights from various fields, including computer science, statistics, psychology, philosophy, and neuroscience. By the end of the course, students should:

- Be aware of the breadth and history of the field;
- Gain familiarity with some basic symbolic and numeric techniques used in AI;
- Understand how AI is incorporated into various commercial applications; and
- Understand some of the ethical and societal implications of the field.

Course requirements/assignments

- 60%: 4 homework assignments (15% each)
- 30%: Final
- 10%: 6 multiple-choice checkpoints (2% each; lowest score will be dropped)

Assignments: Due dates for all homework assignments are on the course schedule (see below, but subject to change). Assignments need to be uploaded to Canvas by 11:59pm on the due date. Late assignments will be docked 10% for each 24-hour period that they are late, up to 3 days. For instance, if a homework is submitted 12 hours past the submission deadline and it scores 87%, its grade will be recorded as 77%. The only exception to this is in the case of

emergency. If you experience an emergency and need to extend an assignment deadline, have your academic advisor contact me as early as possible. Further details (including grading rubrics) will be provided as the class progresses.

Checkpoints: Multiple choice quizzes, designed to take 10-15 minutes to answer will be made available on line after class (see schedule below, subject to change). **No make-ups will be granted** (the lowest score will be dropped).

Participation: Class participation is not formally required, although you will get the most out of class if you ask questions and participate during discussions. Note-taking on laptops is fine, although research has shown that taking notes by hand results in better learning outcomes.

Plagiarism

Cheating—and plagiarism specifically—is a very serious violation of both academic integrity and CMU policy. All content produced for this class must be original to the submitter. Plagiarism is a very serious offense, and will be treated as such. Any sources of information should be cited and acknowledged – if you get assistance from other students or CMU academic resources, you should acknowledge that assistance in the write-up to your assignment (who helped and in what way). It is not a problem for someone to give you general assistance about the techniques used in assignments; it is a problem if they help provide solutions to the specific assignment. Do not take chances with plagiarism: **if you are uncertain whether you are doing something acceptable, please just ask**. We are happy to answer questions about whether something constitutes plagiarism.

Accommodations for students with disabilities

If you have a disability and have an accommodations letter from the Disability Resources office, we encourage you to discuss your accommodations and needs with us as early in the semester as possible. We will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, then we encourage you to contact them at access@andrew.cmu.edu.

Statement of support for your well-being

We, as a community, have to support one another. If you, or anyone you know, experiences stresses, difficult life events, or feelings of anxiety or depression, then we strongly encourage you to seek support. Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is almost always helpful. Counseling and Psychological Services (CaPS) can provide assistance at 412-268-2922 or http://www.cmu.edu/counseling/.

Consider reaching out to a friend, faculty or family member you trust for help getting connected to support that can help.

Course schedule (subject to change)

Jan 14	Introduction & History of AI	HW1 out (written assignment)
Jan 16	Heuristic Search	
Jan 21	Heuristics & Navigation	CP1; HW1 due; HW2 out (Search & CSP)
Jan 23	Constraint Satisfaction	
Jan 28	Probability & Naïve Bayes	CP2
Jan 30	Markov Decision Processes	HW2 due; HW3 out (MDP & RL)
Feb 4	Reinforcement Learning	CP3
Feb 6	AI and Robotics (*Sarjoun Skaff, Bossa Nova*)	
Feb 11	Decision Trees & Logistic Regression	CP4
Feb 13	Perceptrons, Neural Networks	HW3 due; HW4 out (DTs & Neural nets)
Feb 18	SVMs, Clustering	CP5
Feb 20	AI and Finance (*Manuela Veloso, JP Morgan*)	
Feb 25	Ethics	CP6
Feb 27	Case Study & Exam Review	HW4 due